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THE
# Journal of the Society of Arts,
AND OF
THE INSTITUTIONS IN UNION.

No. 313. FRIDAY, NOVEMBER 19, 1858. Vol. VII.

## Journal of the Society of Arts.

*FRIDAY, NOVEMBER* 19, 1858.

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## FIRST ORDINARY MEETING.

WEDNESDAY, Nov. 17, 1858.

The First Ordinary Meeting of the One Hundred and Fifth Session, was held on Wednesday, the 17th inst., Mr. C. Wentworth Dilke, the Chairman of the Council, in the chair.

The following Institutions have been taken into Union since the last announcement:—

Rochdale, Young Men's Christian Association.
Glasgow, Institution.

The CHAIRMAN delivered the following

### ADDRESS.

In appearing before you a second year, it is my duty to explain the circumstances under which I have been elected Chairman of Council, inasmuch as the Bye-Laws state that the office of Chairman is not to be held by any member two years in succession. It will be in the recollection of all, that at the commencement of the Society's year in July 1857, the new Council, at their first meeting, elected a Chairman, and that in the following October, the chair having become vacant, I had the honour to be elected to fill it for the remainder of the year. This year, on proceeding, after the Annual Meeting, to nominate the Chairman, the Council resolved, by distinct vote, that the holding office for part of a year did not disqualify from re-election, and they were pleased again to honour me with their confidence. I hope that at the end of the year I shall have merited the compliment.

In the address read last year three subjects were prominently noticed as requiring the attention of the Council—Artistic Copyright, Parcels Post, and Resources of India.—Considerable progress has been made with reference to the amendment of the law of Artistic Copyright. The Committee, composed as it was of men eminent as painters, sculptors, engravers, and patrons of art, lawyers, and others well acquainted with the subject, having for their Chairman Sir Charles Eastlake, the President of the Royal Academy, at the end of the last Session made their report to the Council, embodying the principles on which any amendment of the law should be based, and they accompanied that report with a draft of a Bill for carrying their views into effect. This report, however, was not made until it was too late to bring the matter fully before the Legislature. Nevertheless, Lord Lyndhurst, who kindly undertook the charge of the Society's petition to the House of Lords, on presenting it as well as petitions from other bodies and individuals, moved for and obtained a Committee of Inquiry on the subject. Owing, however, to the session of Parliament then drawing near its close, this Committee did not enter on the inquiry, but it is hoped that, on the opening of Parliament next year, the Committee will be re-appointed, and that the Session will not close without some well-considered amendment of the law. The Council have already appointed a small Committee, on which Sir Charles Eastlake has consented to serve, for the purpose of taking such measures as may be thought right for best promoting in the Legislature those views which the large and influential Committee of the Society, last year, set forth in their Report.

In regard to the Parcels Post, the Committee on that subject prepared a most able report, which the Council published in the *Journal*, and sent round to the Chambers of Commerce and Institutes in Union. It is now necessary that further steps should be taken to have the principle well considered by the public, and the Council have under consideration the advisability of appointing an evening for its discussion.

The question of "Indian resources" was not proceeded with because it was thought that in the present state of our Indian Empire it would be almost impossible to enter fully into the discussion of the subject without risking political allusions—most undesirable at all times at meetings like those of this Society. This subject will, however, at an early period, be again brought under consideration.

Another subject, however, of great importance, occupied much of the attention of the Council, viz., the propriety of holding a second Great Exhibition in 1861.

The views laid before the Council were carefully considered at several meetings, most of them very fully attended, and it was resolved that it would promote Industry, Art, and Commerce, to hold Decennial Exhibitions. The French nation, who are entitled to the credit of having originated such exhibitions, though limited to native industry, have held twelve since 1798, that is, on an average, one every five years. The number of exhibitors demonstrate that such exhibitions met the wants of the commercial world of France, for they increased steadily on each occasion. In 1798 there were 110; in 1819, 1662; in 1849, 4494; and in 1855, 9790 French exhibitors alone.[*] The great increase in the numbers of exhibitors in 1855 may no doubt be mainly attributable to the extension, for the first time in France, of the principle of the admission of the products of all nations, as had been so successfully carried out by us in 1851.

Englishmen, too, feel the benefits that result from exhibitions. Look at the progress which horticulture has made since the commencement of the Exhibitions of the Horticultural Society of London. Look at the Royal Agricultural Society of England, which has held twenty consecutive annual shows from 1839 to 1858, and on the last occasion—at Chester—there were more exhibitors of cattle and implements, more visitors attended, and the receipts were larger than they had ever been before, and there was a larger contribution from the town itself.[†]

It may be of interest to know, as confirming these views, that the Council of the Royal Agricultural Society, on the motion of Mr. Brandreth Gibbs,—the Hon. Superintendent of the arrangements for the exhibitions, and therefore most intimately acquainted with the feelings of exhibitors,—have decided on holding in 1861, if a site can be found, a Great Metropolitan Exhibition of Cattle and Implements, a proof that the London Exhibition of Implements in 1851 was satisfactory to exhibitors and useful to the agricultural world. It is also an undoubted fact that the shows of Agricultural Implements by the Royal Agricultural Society have led to such improvements in their design and manufacture as to have created a large and important export trade, prominently figuring in our export returns.

It has been said that 1861 is too soon for another International Exhibition. Many, on the contrary, and by far the greater number, so far as opportunity has hitherto been afforded for ascertaining public feeling, are of opinion that, if any benefit is to be derived from comparison, the intervals between one exhibition and another should be less rather than more than ten years: one-third of a generation will have passed away from among us since 1851; one-half, if we look only at the working interests of the world. With the knowledge, then, that the French think five years a sufficient time to intervene; that the Agricultural Society of England meet year after year with increasing success, the Council came to the conclusion that Decennial Exhibitions of Art and Industry would be beneficial. Great changes have taken place in the position of many classes of manufacture since 1851. Manufacturing firms scarcely known at that date have increased and improved their productions in a remarkable manner, and not a few attribute much of their success to the healthy action of the Great Exhibition of 1851, and the publicity given to comparatively unknown—but in many instances highly meritorious—manufacturing establishments. New phases of mechanical invention and of the application of scientific and artistic knowledge to industrial purposes have been developed. The Catalogue and Jury Reports of the Exhibition of 1851 have proved, as was anticipated, most valuable European directories, constantly referred to by buyers from all parts of the world. The catalogue of another Exhibition would present all the features of a timely revisal of a work which has proved of more than ordinary use to mercantile men. The Council, however, whilst considering the subject generally, arrived at the conclusion that two new features ought to be introduced, viz., music and painting; and that every article exhibited should mark progress, and be exhibited in classes,

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[*] FRENCH EXHIBITIONS OF INDUSTRY.

| | | | |
|---|---|---|---|
| 1789... | 110 | 1827... | 1795 |
| 1801... | 229 | 1837... | 2447 |
| 1802... | 540 | 1839... | 3281 |
| 1806... | 1422 | 1844... | 3960 |
| 1819... | 1662 | 1849... | 4494 |
| 1823... | 1642 | 1855.. | 9790 |

[†]

| Date. | Place. | Town Contribution. | Amount paid for Admission. | | | No. of Implement Exhibitors. | No. of Stock Exhibitors. | No. of Head of Cattle Exhibited. |
|---|---|---|---|---|---|---|---|---|
| | | £ | £ | s. | d. | | | |
| 1839 | Oxford... | ... | ... | | | ... | ... | 350 |
| 1840 | Cambridge... | ... | ... | | | ... | ... | 451 |
| 1841 | Liverpool ... | ... | ... | | | ... | ... | 463 |
| 1842 | Bristol... | ... | ... | | | 84 | ... | 497 |
| 1843 | Derby ... | ... | ... | | | 113 | ... | 608 |
| 1844 | Southampton ... | 1000 | 2432 | 3 | 2 | 99 | ... | 716 |
| 1845 | Shrewsbury ... | 1000 | 1682 | 19 | 5 | 93 | ... | 527 |
| 1846 | Newcastle ... | 1000 | 2168 | 15 | 11 | 110 | ... | 775 |
| 1847 | Northampton ... | 1200 | 2473 | 11 | 0 | 142 | ... | 580 |
| 1848 | York ... | 1000 | 2514 | 12 | 0 | 146 | ... | 866 |
| 1849 | Norwich ... | 1000 | 2360 | 15 | 10 | 145 | ... | 799 |
| 1850 | Exeter... | 1260 | 2493 | 19 | 4 | 118 | ... | 769 |
| 1851 | Windsor ... | 600 | 3397 | 4 | 9 | ...‡ | ... | 1226 |
| 1852 | Lewes ... | 1500 | 1184 | 10 | 4 | 105 | 247 | 828 |
| 1853 | Gloucester ... | 1500 | 2734 | 0 | 11 | 128 | 355 | 931 |
| 1854 | Lincoln ... | 1500 | 3378 | 6 | 5 | 130 | 331 | 939 |
| 1855 | Carlisle ... | 1400 | 3260 | 13 | 10 | 121 | 280 | 1076 |
| 1856 | Chelmsford ... | 1200 | 2988 | 8 | 5 | 151 | 318 | 906 |
| 1857 | Salisbury ... | 1500 | 3447 | 15 | 9 | 156 | 356 | 1462 |
| 1858 | Chester ... | 1800 | 6187 | 5 | 5 | 197 | 402 | 1444 |

‡ Implements in 1851 were exhibited in London at the Crystal Palace.

The average number of visitors at the several country meetings, up to the Chelmsford meeting, was found to be about 35,000, but at Salisbury the actual number was 36,023, while at Chester it amounted to no less than 63,866.

and not in nations, as in 1851. Those, for example, who wish to study silks, should have all silks brought at once before their view, and not be obliged to run from one end of the exhibition to the other, from Spitalfields to Genoa, and back to Lyons; those, again, whose trade is in ribbons, should be able at once to study the combinations of Coventry and the colours of Switzerland.

The questions which will naturally arise, and which it will probably fall to the province of the Council to solve, will be the management to which the Exhibition should be confided, and the means of raising the necessary funds. The first step will, of course, be to ascertain how far the Commissioners of the Exhibition of 1851 are willing or able to carry on such an undertaking, or if not, how far they will assist and support the proposed Exhibition.

The Council will, therefore, at an early period, proceed to communicate their views to the Commissioners, and institute an inquiry how far those views are entertained and supported by the public and by the manufacturing and commercial world at large. Much of the business of this session, must, therefore, have especial reference to the proposed exhibition of 1861. The Council propose to call together some of the committees of the various classes into which the exhibition will probably be divided, and to ask their opinions as to the special wants in each class.

During the past year, the Council has also directed its attention to the collection of information likely to be beneficial to trade and commerce, and of use to intending emigrants to our Colonies. Several valuable papers relating to the vegetable productions and mineral wealth of particular Colonies, have been read at our weekly evening meetings, and the success and interest of these papers induced the Council to consider the propriety of nominating a Colonial Committee for the collection of information relating to the climate, vegetable, animal, and mineral products, of our several colonies, and for the reception and exhibition of specimens and samples of produce, whenever and from wherever they can be obtained. The want of some such centre, where the scattered information relative to the trade and commerce of Great Britain and her colonies might be collected and thus made available, has long been felt by the Council. Unlike Manchester, Liverpool, and other large towns in the kingdom, London has no Chamber of Commerce. The Council therefore hope and believe that great and permanent good must result from the establishment of this Committee to the benefit equally of the colony and the mother country, and the Council have already ascertained that the Colonial Minister, Sir Edward Bulwer Lytton, is willing to co-operate with the Society in this object, and forward communications from the Society to the several Governments and Chambers of Commerce in the Colonies.

The Examinations in connexion with the Institutes in Union with the Society have been held this year with complete success. It will be remembered that, in order to make it possible to extend the Examinations throughout the Union, and to prevent the system from becoming too greatly centralised, the last Council introduced certain changes, the two most important of which provided that the Society's Final Examinations should be conducted by papers worked under proper supervision in the several localities, instead of bringing the candidates to two or three centres; and that every candidate admitted to these Examinations must have previously undergone an examination before a Local Board appointed by the authorities of his Institute. The effect of these changes has been most satisfactory; fifty-nine Local Boards were formed; the Society's Examinations were held at thirty-two different places, and the awards were given by the Society's Examiners in London without confusion or difficulty. The Council will carry out the Examinations of 1859 in the same manner. A programme, specifying all the arrangements, has been already issued; the number of Local Boards prepared to act is already increased; and it may be hoped that even a larger number of candidates than in previous years will avail themselves of the Examinations in 1859. The Council has the advantage of the services of the same distinguished Board of Examiners as on the last occasion.

The names of the following gentlemen have been reported to the Council as contributors to the Examination Prize Fund:—

| | |
|---|---|
| Mr. Haden ... ... ... | Two Guineas. |
| „ Haldimand ... ... | Ten Guineas. |
| „ Highton ... ... | Two Guineas. |
| „ Holmes ... ... | One Guinea. |
| „ Henry Johnson ... | Twenty-five Pounds. |
| „ C. Ratcliffe ... ... | Ten Guineas. |
| Rev. F. Temple, D.D... | Six Guineas. |
| „ A. Wilson ... ... | Two Guineas. |
| Mr. Wentworth Dilke.. | Ten Guineas. |

The members have already been informed that, at the request of the Council, Lord Derby kindly consented to place in their hands the privilege of selecting from the successful candidates at the last Examinations of the Society, four to be nominated to compete for situations in the gift of the Treasury. Two nominations have already been made. There were four vacancies to be filled up, and twelve competitors, and it must be a matter of congratulation to the members of the Society to know, that both the nominees selected by the Council, Mr. Thomas Ross Howard, of the Crosby-hall Evening Classes, and Mr. George Edward Skinner, of the

Lymington Literary Institution, were successful in obtaining appointments—Mr. Howard standing first and Mr. Skinner third.

The Council is engaged in an endeavour to bring the advantages of union with the Society within the reach of a greater number of Institutes.

The Committee on Surgical Instruments, which it was proposed to form last year, has met, elected its officers, and divided itself into sections, representing the various branches of the subject. More than sixty medical men of eminence have consented to act, and Mr. James Luke has been elected to the office of President, with Drs. Watson and Budd, Mr. Henry Charles Johnson and Mr. Richard Partridge as Vice-Presidents, and Mr. Seymour Haden and Mr. Mitchell Henry as reporters. At a general meeting of the Committee, to be held before the close of the year, it will be proposed to adopt measures having for their primary object a complete classification of all the mechanical contrivances applied to medicine and surgery, so as to insure, in any future exhibition, a more complete illustration of that branch of industry than was attempted in 1851, and, secondly, to further the interests of the public and the medical profession by inducing manufacturers to submit their improvements to the examination and award of the Society.

The members are aware that during last Session the Council appointed a Committee to undertake an inquiry into the nature and causes of the decay of Gutta Percha, and as to its sources of supply. This inquiry will naturally extend over a considerable period, and the Committee have been, and still are, actively engaged in carrying on a series of experiments and collecting information. The importance of this inquiry can hardly be over-rated, when it is remembered how largely Gutta Percha is employed for our telegraphs, whether by land or by sea, for tubing, for agricultural, for surgical, and for an almost infinite variety of purposes.

On the 20th of January next, the anniversary of the death of Dr. Swiney, the award of the Prize given under his will will be made. This award takes place on every fifth anniversary of Dr. Swiney's death; and, as there are many new members of the Society who are probably unaware of the nature of this bequest, I may mention that Dr. Swiney, by his will, bequeathed to this Society a sum of Consols on trust, that on every fifth anniversary of his death, they should present "to the author of the best published Treatise on Jurisprudence, a Silver Goblet, of the value of £100, containing gold coin to the same amount." As judges to award the prizes, he associated the College of Physicians with the Society of Arts. The first award was made in 1849, the second in 1854, and the third will be made in January, 1859. In the first instance Mr. Maclise, R.A., was commissioned to furnish the Society with a suitable design for the goblet, and from that design the goblet for the next award will be made.

The important improvements which are taking place in the construction of our tools and implements, as well as in the machines employed by our manufacturers throughout the country, are daily increasing in number, while the modifications which have been made in the patent laws, and the advantages which have resulted to the public by the immediate publication of the specifications of the patents themselves, have tended much to the advantage of the inventor and the public at large. The Council would call attention, therefore, to the fact that they have, during the vacation, been engaged in perfecting the arrangement for affording members facilities for reference to the Library of Patent Specifications, and they are now glad to be able to state that they have had a room fitted up for the reception of works issued by the Commissioners of Patents, and the entire series of specifications, from James the First down to the present date, have been bound, and are now ready for reference at all times, but the Council cannot allow any of the volumes to be removed from the premises, as the series must be retained as part of the library of reference.

The Council would also call the attention of members to the Exhibitions of Patented Inventions which it has held yearly since 1848, and which have served as records of the mechanical requirements of the times. The exhibition of the past year had a greater number of exhibitors than the previous year, and the next will open on Easter Monday, March 25th. This series they purpose to continue.

The Council, previous to separating for the vacation, took the necessary steps for preparing a new premium list, and as soon as the committee appointed to consider the question has made its report, the list of subjects will be made public, and they wish it to be understood that medals may be claimed for communications, whether in reference to patented or unpatented processes or machines. In addition to the ordinary list, the Society is this year enabled to offer several special premiums, in conformity with the bequests of Dr. Swiney, Dr. John Stock, and Dr. Fothergill.

Mr. Benjamin Oliveira has placed at the disposal of the Council the sum of £25 to be awarded by them as a gold medal or otherwise, for such subject as they may select. In doing so, they trust that the prize offered may prove as successful in eliciting the desired information as was a former prize offered by Mr. Oliveira, which was awarded to Mr. C. Wye Williams for his Essay on the Prevention of the Smoke Nuisance, an award which was subsequently confirmed by the Committee of the Newcastle Association, who adjudged the sum of £500 to that gentleman for his labours.

The adjudicators appointed by the Society to report on the merits of the twenty-two Essays sent in in competition for the prize of two hundred guineas offered by Mr. Henry Johnson, have made their award, and the prize has been paid, with Mr. Johnson's consent, to Mr. Edward Capps, of Cheshunt-terrace, Bermondsey.

The general list for which medals are offered comprises a large number of subjects. It has been stated by some members that a shorter list and smaller number would be calculated to elicit a larger response from the public. In reply the Council would point attention to the fact that the object of the Society is not to direct attention to the wants of any one branch of industry in particular, but to endeavour to obtain information in reference to wants wherever they believe them to exist, and to stimulate inquiry in such directions as will tend to the progress of trade generally. Such being the view which the Council takes of its functions, the list necessarily extends over a wide field of inquiry, and although apparently a numerous list, the Council feel that they would not be discharging their duty impartially if they kept back any large number of the subjects which are included in it. On the contrary, it would be a far easier task to extend than to diminish the list.

During the spring it is intended to hold two conversazioni, one of which, in accordance with the wishes expressed by a large number of members, will again, if permission be granted by the Committee of Council on Education, take place in the Museum of the Department of Science and Art at South Kensington.

It now becomes my duty as chairman to present the medals which have been awarded by the Council.

The medals were then presented as follows:—

To Mr. J. Algernon Clarke, for his Essay[*] "On the Application of Steam-power to the Cultivation of the Soil."

To Mr. A. G. Findlay, for his Paper "On the Progress of the English Lighthouse System."

To Mr. Wentworth Lascelles Scott, for "A Self-registering Maximum Thermometer for great depths at Sea."

To Mr. Wm. Stones, for his Paper "On New Zealand and its Resources."

To Mr. F. R. De la Tréhonnais, for his Paper "On the past and present of French Agriculture."

To Mr. John Underwood, for his Paper "On the History and Chemistry of Writing, Printing, and Copying Inks, and a new plan of taking manifold copies of written and printed documents, &c."

To Dr. J. Forbes Watson, for his Paper "On the Composition and Relative Value of the Food Grains of India."

To Mr. William Williams, for his "Machine for Cutting and Dressing Stones for Building Purposes."

To Mr. J. W. Wilson, for his "Combination of the tubular gouge and disc-paring tool for wood-shaping machinery."

To Professor John Wilson, F.R.S.E., for his Paper "On Canada: its Productions and Resources."

The Secretary announced that on Wednesday evening next, the 24th inst., a paper by Mr. F. Joubert, "On a Method of rendering Engraved Copper-Plates capable of Producing a greatly-increased Number of Impressions," would be read. On this evening George T. Doo, Esq., R.A., will preside.

## VEGETABLE PARCHMENT.

The following report in reference to this substance has been addressed to Messrs. Thomas De La Rue and Co., by A. W. Hofmann, LL.D., F.R.S., Professor of Chemistry to the Government School of Mines:—

In accordance with your request, I have carefully examined the new material, called vegetable parchment, or parchment paper, which you have submitted to me for experiment, and I now beg to communicate to you the results at which I have arrived.

I may here state that the article in question is by no means new to me; I became acquainted with this remarkable production very soon after Mr. W. E. Gaine had made known his results, and I have now specimens before me which came into my possession as early as 1854. My attention was again called to the subject in 1857, when my friend, Mr. Barlow, delivered an interesting discourse upon vegetable parchment, at one of the Friday evening meetings of the Royal Institution.[*] Hitherto, however, I had not myself experimented upon the subject.

The substance submitted to me for examination exhibits in most of its properties so close an analogy with animal membrane, that the name adopted for the new material seems fully justified. In its appearance, vegetable parchment greatly resembles animal parchment; the same peculiar tint, the same degree of translucency, the same transition from the fibrous to the hornlike condition. Vegetable, like animal parchment, possesses a high degree of cohesion, bearing frequently repeated bending and rebending, without showing any tendency to break in the folds; like the latter, it is highly hygroscopic, acquiring by the absorption of moisture increased flexibility and toughness. Immersed in water, vegetable parchment exhibits all the characters of animal membrane, becoming soft and slippery by the action of water, without, however, losing in any way its strength. Water does not percolate through vegetable parchment, although it slowly traverses this substance like animal membrane by endosmotic action.

In converting unsized paper into vegetable parchment or parchment paper by the process recommended by Mr. Gaine, viz., immersion for a few seconds into oil of vitriol diluted with half its volume of water, I was struck by the observation how narrow are the limits of dilution between which the experiment is attended with success. By using an acid containing a trifle more of water than the proportion indicated, the resulting parchment is exceedingly imperfect; whilst too concentrated an acid either dissolves or chars the paper. Time, also, and temperature are very important elements in the successful execution of the process. If the acid bath be only slightly warmer than the common temperature, 60° F. (15.5° C.)—such as may happen when the mixture of acid and water has not been allowed sufficiently to cool—the effect is very considerably modified. Nor do the relations usually observed between time, temperature, and concentration appear to obtain with reference to this process; for an acid of inferior strength, when heated above the common temperature, or allowed to act for a longer time, entirely fails to produce the desired result. Altogether the transformation of ordinary paper into vegetable parchment is an operation of considerable delicacy, requiring a greal deal of practice; in fact, it was not until repeated failures had pointed out to me the several conditions involved in this reaction, that I succeeded in producing papers in any way similar to those which you have submitted to me for experiment.

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[*] **This Essay was sent in competition for the Medal offered in the Society's Premium List.**

[*] **On some Modifications of Woody Fibre, and the Applications, by the Rev. J. Barlow, M.A., F.R.S., &c.**—*Proceedings of the Royal Institution of Great Britain.*

Mr. Barlow, in the discourse on woody fibre to which I have alluded, records some experiments establishing that unsized paper, by its conversion into vegetable parchment, receives no appreciable increase of weight. These experiments rendered it very probable that the action of sulphuric acid in this case is essentially molecular, and that the chemical composition of the substance of the paper by its conversion into parchment is not altered. It remained to establish this point experimentally. For this purpose several of the specimens of commercial vegetable parchment, without any further purification, were submitted to analysis. The result showed that—with the exception of about 0.9 per cent of mineral matter, a quantity not much exceeding the amount which is present in the better varieties of ordinary paper—the substance of vegetable parchment *is identical in composition with cellulose or woody fibre.* The analytical experiments demonstrate—as might have been expected—that the extraordinary change which the properties of paper undergo during its transformation, depends solely and exclusively upon a molecular re-arrangement of the constituents, and not upon any alteration in the composition of the paper. In this respect, the action which sulphuric acid exerts upon woody fibre, may be compared to the transformation of woody fibre under the protracted influence of the same agent into *Dextrin*, a substance altogether different from fibre, but still identical with it in composition. Vegetable parchment may, in fact, be looked upon as the connecting link between cellulose on the one hand, and dextrin on the other.

Thus it is obvious that the transformation, under the influence of sulphuric acid, of paper into vegetable parchment, is altogether different from the changes which vegetable fibre suffers by the action of nitric acid; the cellulose receiving, during its transition into pyroxylin and gun-cotton, the elements of hyponitric acid in exchange for hydrogen, whereby its weight is raised, in some cases by forty, in others by as much as sixty per cent. As the nitro-compounds thus produced differ so essentially in composition from the original cellulose, we are not surprised to find them also endowed with properties altogether different; such as increased combustibility, change of electrical condition, altered deportment with solvents, &c., whilst vegetable parchment, being the result of a molecular transposition only, in which the paper has lost nothing and gained nothing, retains all the leading characters of vegetable fibre, exhibiting only certain modifications which confer additional value upon the original substance.

The nature of the reaction which gives rise to the formation of vegetable parchment having been satisfactorily established, it became a matter of importance to ascertain whether the processes used for the mechanical removal of sulphuric acid from the paper had been sufficient to produce the desired effect. It is obvious that the valuable properties acquired by paper, by its conversion into vegetable parchment, can be permanently secured only by the entire absence or perfect neutralisation of the agent which produced them. The presence of even traces of free sulphuric acid in the paper would rapidly loosen its texture, the paper would gradually fall to pieces, and one of the most important applications which suggest themselves, viz., the use of vegetable parchment in the place of animal parchment for legal documents, would thus at once be lost.

Examination of the vegetable parchment for free sulphuric acid was, therefore, one of the principal points to which I had to direct my attention. From the description of the process adopted in preparing the new material, viz., long-continued mechanical washing with cold water, immersion in a dilute solution of caustic ammonia, and, lastly, renewed washing with water, the absence in it of free sulphuric acid may be at once inferred on scientific grounds. For, supposing that the first process of washing had left any free sulphuric acid in the paper, this acid, after immersion of the paper in caustic ammonia, for which it has so strong an attraction, could have remained only in the form of sulphate of ammonia, a salt of perfectly neutral composition, in which the acid character of sulphuric acid is entirely lost. Now, sulphate of ammonia is a most stable compound, which begins to decompose only at about 536° F. (280° C.), a temperature at which paper is completely destroyed, and even then, no free sulphuric acid is to be found amongst the products of decomposition. But the paper is washed again after treatment with ammonia, and obviously only traces of sulphate of ammonia can remain in it.

The absence of free sulphuric acid in the parchment paper was, moreover, established by direct experiment. The most delicate test-papers left for hours in contact with moistened vegetable parchment, did not exhibit the slightest change of colour. Several square feet of parchment paper were cut up into small pieces, and boiled for half a day with water; the liquid was filtered off, and the solution concentrated to a few drops. The liquid thus obtained was found to contain sulphate of lime and sulphate of ammonia, and slightly reddened blue litmus paper, in consequence of the presence of the sulphate of ammonia, which though neutral of composition, like so many other neutral salts, affects vegetable colours. In fact, on dissolving pure sulphate of ammonia, which had been crystallized, from a solution purposely rendered alkaline by the addition of ammonia, a solution was obtained, exhibiting even a greater effect upon blue litmus-paper. The absence of free sulphuric acid in this liquid was, moreover, directly proved, for paper moistened with this concentrated liquid, and dried at 212° F. (100° C.) exhibited no kind of disintegration, the liquid producing, in fact, not more effect upon paper than common water. This experiment appears to me conclusive; for, supposing even an extremely minute quantity of free sulphuric acid in the vegetable parchment, it is obvious that, by withdrawing this acid from a considerable quantity of paper, and concentrating its action upon a single strip at as high a temperature as that of boiling water, a very perceptible effect of disintegration would have resulted.

From the above considerations and experiments, I conclude that vegetable parchment, as prepared by the process which you describe in your letter, and as represented by the samples accompanying it, does not contain a trace of free sulphuric acid. I conclude, moreover, that the sulphates, of which minute quantities are present in this as in almost every variety of paper, cannot possibly develop free sulphuric acid by any influences to which the vegetable parchment is likely to become exposed. There is no reason, therefore, to believe that vegetable parchment, prepared as it is by one of the most powerful agents of decomposition, carries within itself the germ of its own destruction.

In addition to the experimental evidence already adduced, it may be stated that if such were the case, a change would become perceptible after a comparatively limited period; but specimens of Vegetable Parchment which have been in my possession for upwards of four years, cannot by any possibility be distinguished from the samples which you have forwarded, and which I presume have been only recently made.

The absence of free sulphuric acid in Vegetable Parchment having been satisfactorily established, it remained only to perform a few experiments on the strength of this material as compared with that of the animal parchment, with which it is likely to enter into competition. For this purpose, bands of vegetable andof animal parchment both $\frac{7}{8}$ of an inch in width, and as far as possible of equal thickness, were slung round a horizontal cylinder, and appropriately fixed by means of an iron screw-clamp pressing both ends upon the upper part of the cylinder. The band assumed in this manner the shape of a ring, into the bend of which a small cylinder of wood was placed projecting on each side about an inch over the band and carrying by means of strings fastened to each end a pan, which was loaded with weights until the band gave way. A set of experiments[*] made in this manner led to the result, that paper by exposure to the action of sulphuric acid in the manner described, acquires about five times the strength which it previously possessed, and that for equal weights, vegetable parchment posseses about three-fourths the strength of animal parchment. It was found, moreover, that bands of vegetable parchment taken from different sheets of the same kind of paper, exhibited a remarkable uniformity of strength, whilst in animal parchment, which, owing to its mode of manufacture, must always present considerable inequality of thickness, extraordinary variations were observed, even if the bands were taken from the same skin. These results differ somewhat from those observed by Mr. Barlow, who found the strength of vegetable parchment higher than it would appear to be from my experiments. This discrepancy may probably arise from the fact that Mr. Barlow experimented with specially prepared paper, whilst I operated purposely on samples representing the commercial article, such as it is manufactured on a large scale.

Vegetable parchment, then, as far as strength goes, is not quite equal to animal parchment. On the other hand, the new article greatly surpasses real parchment in its resistance to the action of chemical agents, and especially of water. As has been already stated, vegetable, like other parchment, absorbs water and becomes perfectly soft and pliable; but it may remain in contact, and even may be boiled with water for days, without being affected in the slightest degree, retaining its strength, and regaining its original appearance on drying; on the other hand, it is well known how rapidly animal parchment is altered by boiling water, by the protracted action of which it is converted into gelatine. Even at the common temperature, animal parchment, in the presence of moisture, is very prone to putrefactive decomposition, whilst parchment paper, in which nitrogen, this powerful disturber of chemical balance, is absent, may be exposed to moisture, without the slightest change either in appearance or properties. It would in fact be difficult to find a paper-like material endowed with greater power of resistance to the disintegrating influences of water than vegetable parchment.

Taking into consideration the chemical composition of the new material, its cohesive power, and its deportment with chemical solvents, especially water, both at the common temperature and at the temperature of its boiling point, it is obvious that this substance unites in itself, in a most remarkable manner, the conditions of permanence and durability, and I have no hesitation in stating my belief that vegetable parchment properly prepared, is capable of resisting the tooth of time for many centuries, and that under various circumstances it will last even longer than animal parchment.

The valuable properties of vegetable parchment suggest a great variety of applications for the new material.

There is no doubt that parchment paper may be adopted, with perfect security, for all legal documents, policies of insurance, foreign bills of exchange, bills of lading, scrip certificates, and other similar documents, as a substitute for the skins which are now generally used. On the other hand, its comparatively low price would appear to suggest its application in a variety of cases, in which, at present, paper is employed: for instance, for private ledgers of banking-houses, or other large establishments, as well as for registries of wills, marriages, baptisms, and deaths. Even for the manufacture of bank notes it may be found useful; indeed, for all documents, the preservation of which is of importance. Many of the documents in question, in order to protect them from injury in case of fire, are generally kept in safes, the majority of which are now encased in solid water,—the water of crystallisation in alum, and other similar hydrated compounds. The interior of these safes, in case of exposure to heat, must, obviously, become filled with steam of a high temperature, and it cannot be doubted that documents written on vegetable parchment, owing to the extraordinary power with which this material resists the action of boiling water and of steam, will stand a much better chance of preservation under such circumstances than those written on common paper or animal parchment.

As another advantage of vegetable parchment as compared with animal parchment, the experience may be quoted that vegetable textures are much less attractive to insects than animal structures. Moreover, to increase the security of vegetable parchment in this respect, the paper, before conversion, may be incorporated with chemical agents, which, like salts of mercury, for instance, have been employed with such advantage in the manufacture of paper for public records.

In considering the applicability of vegetable parchment for legal documents, another property of this remarkable material, although perhaps of minor importance, deserves nevertheless to be noticed. This is the great difficulty with which words are erased from its surface, and others are substituted in their places. Deeds written on parchment paper acquire thereby a certain degree of security against falsification.

Its strength and resistance to water appear to recommend parchment paper in an eminent degree for engineers' and architects' plans, and especially for their working plans, which are often unavoidably subjected to rough usage and moisture. The thinner sheets of parchment paper, on account of their transparency, present the additional advantage of being useful as a most durable tracing paper.

In consequence of its strength and resistance to water, vegetable parchment would probably find many applications for military purposes; thus it promises to furnish an excellent material for water-proof cartridges.

Another field of considerable extent for the application of vegetable parchment appears to be in book-binding, and especially in ornamental book-binding. The books bound in parchment paper which accompanied your letter, are remarkable for the beauty and solidity of their binding. Experienced book-binders, to whom I submitted these books, believed them to be bound in real parchment. Even in the manufacture of books and maps which, like those used for educational purposes, like military plans and nautical charts, have to stand considerable wear and tear, parchment paper may find a very useful application. The printing on ordinary paper is not changed by the treatment with sulphuric acid, but owing to the shrinking of the paper during the process, it will probably be found more convenient for such pur-

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[*] The following are the details of these experiments:

WATER LEAF PAPER.

broke, when loaded with

| I. | II. | III. | Mean. |
|---|---|---|---|
| 17lbs. | 15lbs. | 15lbs. | 15.6lbs. |

VEGETABLE PARCHMENT.

broke, when loaded with

| I. | II. | III. | Mean. |
|---|---|---|---|
| 78lbs. | 75lbs. | 70lbs. | 74lbs. |

ANIMAL PARCHMENT.

broke, when loaded with

| I. | II. | III | Mean. |
|---|---|---|---|
| 92lbs. | 78lbs. | 56lbs. | 75lbs. |

The strips of vegetable and animal parchment were selected as nearly as possible of equal thickness, but the strips of artificial product were somewhat heavier than those of real parchment. On an average the former weighed 18 grains, and the latter only 12.75 grains. Calculated for equal weights, the strength of animal parchment as compared with that of artificial parchment, is obviously $\frac{18}{12.75} + 75 = 105$. In round numbers, it may be said that vegetable parchment has three-fourths the strength of animal parchment.

poses to print on the paper after it has undergone the transformation. Vegetable parchment is remarkable for the facility with which printer's ink, as well as writing ink, may be applied to it, and for its attraction for dyes generally, many of which it appears to take even more readily than calico. The specimens of dyed parchment paper, which accompanied your letter, leave nothing that could be desired in this respect.

Among the numerous more or less important applications in which parchment paper is sure to be found useful as soon as it becomes accessible to the general public, its adaptation for household, and especially for culinary purposes must not be left unmentioned.

In closing the orifices of vessels for preserves, &c., few housewives will hesitate to substitute an elegant material like vegetable parchment paper for the animal membrane, so frequently offensive, which is now generally in use.

Formed into bags of which the seams are cemented with the white of egg, parchment paper will be found very useful for the purposes of boiling and stewing, according to the principles of a refined and scientific *cuisine*.

Nor can the chemist fail to derive some benefit from so interesting an achievement of his own science as the transformation of paper into parchment.

In the laboratory, vegetable parchment will become a material of general use for connecting retorts and condensers, or other similar apparatus, and on account of its indestructibility by many of the fluids usually employed in electric batteries, it will probably find a further and even more important application in the construction of diaphragms for galvanic apparatus.

**Royal College of Chemistry.**

## RATING OF INSTITUTIONS.

The following decision, in reference to this subject, was given in the Court of Queen's Bench on the 13th instant:—

The case stated for the opinion of the Court was, whether the shareholders in the "Bradford Library and Literary Society" were liable to be rated to the poor-rate. The shareholders claimed exemption from the rate upon the ground that the society came within the 6th and 7th Victoria, cap. 36, which, by the 1st section, enacted that no person should be liable to be rated to any county or parochial rates in respect of any land or buildings belonging to "any society instituted for purposes of science, literature, or the fine arts exclusively," provided such society should be wholly or in part "supported by annual voluntary contributions," and should not, and by its laws could not make any dividend or bonus in money among its members, and should also be certified as required by the Act. The society in question had, by a deed dated the 4th of August, 1853, purchased the property in respect of which they were rated, and by a supplemental deed of the 16th of April, 1856, the laws of the society were agreed to and confirmed by the shareholders. The society was duly certified as required by the Act, the premises in the occupation of the society were exclusively used for its objects—being supported by the purchase-money of shares, annual subscriptions of members, rents received from a certain portion of the premises let to tenants who paid rates,—by fines, sale of spoiled books, sale of catalogues, money raised on mortgage of building, and quarterly subscriptions of temporary residents who were subscribers to the library. By the laws no dividend was allowed to be made among the members. The library consisted of the works of standard authors, magazines, novels, and such other books as the committee might admit, and these, together with the other effects of the Institution, were the property of the shareholders, who were limited to 600. The books circulated only among the shareholders and temporary residents in the town, and the library was open each day for the sole use of the subscribers, and temporary residents who obtained free introduction from the proprietors.

Lord Campbell (Chief Justice), on delivering judgment, said he was of opinion the society was entitled to the exemption claimed. He thought the object of the Act was very laudable, but that the means by which it sought to effect it were very questionable, for it seemed to be unjust to call upon the rate-payers of a particular district to pay for the exemption of an Institution to which they had no access, and from which they derived no benefit. But the Legislature had enacted that no person should be assessed to any county or parochial rates in respect of land or buildings belonging to "any society instituted for purposes of science, literature, or the fine arts exclusively," &c. He adhered to what had been said in the cases referred to by counsel, and if this case could have been brought within those decisions, if the facts had resembled those referred to, the exemption could not have been claimed. But here, this was a "society instituted for purposes of science, literature, and the fine arts exclusively." It was a public library, admitting books of science, literature, and the fine arts, and there was nothing to show that any pecuniary or private advantage was in the contemplation of those who established it. The case of the Birmingham Library was good law; and this was a library containing all the standard books good for individuals and advantageous to the public. Then, was it not supported wholly or in part by voluntary contributions? This was settled by the case of the Linnæan Society, when the Court said that money paid under an obligation voluntarily incurred was a voluntary contribution. Upon the whole, his lordship thought the society was established for the purposes of science, literature, and the fine arts exclusively, and was entitled to the exemption claimed.

Mr. Justice Erle said he thought the society was entitled to the exemption, as being instituted for the purposes of science, literature, and the fine arts exclusively, and supported by voluntary contributions. The object of the Act was, that large and enlightened minds might be kept in sound and healthful action—an object which the Legislature thought might be more beneficial to a parish than the saving of a halfpenny in a pound. It was necessary that all the great faculties of the mind—memory, reason, and imagination—should be cultivated, and for these several faculties there were works of history, science, and novels. The imagination was a great faculty of the mind, which ought to be cultivated, and, therefore, there was no objection on the ground that novels and other works of imagination were introduced. In one sense a personal benefit was derived by the members, but was of a contrary nature to that referred to in the cases cited, where the subscribers had made a kind of investment of their money.

## BRITISH ASSOCIATION, LEEDS, 1858.

### Some Modern Appliances for Raising Water. By W. E. Carrett, Sun Foundry, Leeds.

The following Paper was read before the Mechanical Section:—

Mechanical Science and the "times" are rapidly progressing, as certain as "cause and effect." Next, perhaps to the greatest of modern inventions, the steam-engine, must rank the "Pump," in its various useful phases of quiet underworking, helping human progress in its countless manifestations, and bringing to light hidden sources of power.

Our lands want draining—their crops invigorating—and our coal-fields keeping dry, for water *will* gravitate, and we must keep pumping. If steam is to occupy the place of human power, this water must be "forced" into our boilers; and if comfort and health are to be in our our dwellings, it must be "forced" there too.

From the great Leigh-water, at Haarlem, down to the common domestic pump, there are a variety of appliances. We have "suctional" and "force" pumps, "centrifugal" and "Archimedean," "spray pumps," "percussion pumps," "wheel pumps," "chain pumps," "rotatory vibratory," and others, but the two varieties here claiming a share of attention combine both "steam-engine" and "pumps" in direct action—"power" and "work" associated agreeably, "hand-in-hand," to administer to our wants—perform the drudgery of life's necessities, and leave us more time to think and act.

The drawing shows but two combinations of the "steam-engine" and "pump;" in each case the steam cylinder is immediately over and in immediate communication with the pump beneath. A comparatively slight transposition of detail would arrange these horizontally, if required.*

The first, Fig. 1, is a "steam-pump," of the high-pressure transportable class, having a fly wheel and connecting rods to the crank shaft; and Fig. 2 is a modification of this for special cases, where lightness and portability are requisite; while Fig. 3 is a compound high and low pressure condensing "steam-engine," also in direct communication with its pump, and of much larger proportions, used as a "water-lift." Upon the two former we would first direct your attention. The object here in view is simplicity and durability of parts, a quiet and noiseless action, and, as far as possible, a superior duty effected with a minimum expenditure of power. The chief feature to be observed is, the application of the suctional and compressive air vessels in close proximity to the pumps, by which it is able to fetch the water from any distance (of course within the limits determined by friction in the pipes), or from a depth not exceeding 29 feet, and to force it any required height or distance.

The ordinary simple pump cannot do this unless at a miserably slow speed, so as to give the water sufficient "time" to be "stopped and started" throughout the entire range of the pipes at each alternate stroke.

Three common pumps, driven by a three-throw crank, will do it at a cost, but not without complication of parts and sacrifice of all "direct-action" simplicity. This resistance of the water's "inertia" against being rapidly started into motion, and the impelling influence of its "momentum" when *in* motion," have caused countless failures and disappointments in pumping schemes. To get an ample supply of water quietly and freely into and out of the pump, is not always as easy as it is desirable.

Since, therefore, the water in a long range of suctional and delivery pipes will not be stopped and started into motion in immediate accordance with the demands of a single-acting pump, but will testify its natural objection to be hurried by a series of shocks and strains, which soon impair the best machinery and clacks that can be applied; since, further, a double-action pump is little or no better, nor are we disposed to sacrifice "direct action," and apply three pumps, or to be content with one large one driven at slow speed, we must adopt a more simple and effective expedient, which, to the writer's best judgment, consists in these air-vessel appliances which enable the pump to work quietly at a speed of 110 feet per minute.

A continuous stream in the pipes is, therefore, essentially necessary.

Perhaps one practical case in point may show this clearly enough for our object. Some years since, the writer had to inspect a pair of single-acting plunger pumps, of considerable size (driven "opposite" and simultaneous) constructed to force about 150 feet high, and draw the water say 30 feet distance and from 15 feet depth. They would not pump at all, except at a very slow speed, quite insufficient for the purpose, a few strokes beyond this; the shocks and percussion in the pumps and pipes threatened total destruction, to say nothing of the power lost. An air-vessel was suggested, and applied to the delivery side of the pump, and was expected to put all right, but it only changed the character of the evil. At each "up-stroke" the water could not follow the ram for want of "time," and when the down-stroke commenced the inlet current was about at full speed, and actually accumulated to some five to seven pounds per square inch in the suction pipes.

Another air-vessel close to the inlet of the pump at once settled all difficulties, and the action became at once noiseless and effective even at a fourfold speed. So simple was the remedy for so great an evil. And yet there are hundreds of mal-constructions to be met with everywhere, in which the pump and water are thus continually combating with each other. Turning to advantageous account this percussive action of the inertia and "momentum" of water, we have Smeaton's simple contrivance (whose birth place and remains are but a few miles from this town) the "hydraulic ram," in which the gravitating power of a body of water forces a portion of itself to a greater height; and we might further exemplify it in the shape of a "percussive action suction-pump," which would raise the water, by the joint impetus of its momentum and the pressure of the atmosphere, from a greater than the usual depth of 30 feet. In reference to our illustration, a good "single-action" plunger pump does all that is required. A is the ram, B and C the inlet and outlet clacks, D the suctional air vessel, into which the water is continally flowing, and E the compressive air vessel which regulates the equality of the discharge. F is the steam cylinder, G the crank shaft of the fly-wheel, H a frame striding this shaft, and transmitting the power of the engine to the pump. This frame is curved to the arc determined by the length of the connecting rods, and moves up and down with the piston rod, but does not touch the crank shaft passing through it. The purpose of this will be obvious.

In Fig. 2 the air vessel arrangement is disposed in two hollow columns, supporting the steam cylinder, and is suited for greater pressures where compactness and durability are essential. The same letters of reference apply to both Figs. 1 and 2. Examples of each of these can be seen in the Machinery Court of the Industrial Exhibition in this town.

We will next proceed to call your attention, as consisely as possible, to another arrangement of "water-lift" steam-pump, in which the water is not enclosed in pipes, and there is no rotative medium in the shape of a fly-wheel employed. This engine was lately constructed by us, and erected in Holland for surface drainage, to work at 5 to 15 strokes, and to raise 7,000 gallons per minute.

The steam cylinder is 25 inches in diameter, and the pump 5 feet. Now, if the cylinder here represented were of ordinary single-action construction, receiving the steam underneath the piston, and then discharging it into the atmosphere, thus effecting the "up stroke" by mere high pressure, the arrangement would be one of pretty general use for colliery purposes where cost of fuel is unimportant, but the engine here under consideration is designed to work with greater economy than can be obtained from high pressure steam only partly expanded, and afterwards "throttled out" into the atmosphere.

The cylinder A is fitted with a piston in the usual manner, but underneath, and attached to this piston, is a trunk (B) turned up and passing through the bottom of the cylinder, and working steam tight inside another cylinder (C), which, in this case, becomes the air pump.

From the bottom of this air pump a further prolongation of the rod, D, communicates motion to the bucket of the pump (which, in some cases, would be substituted by a ram).

Hence, from this disposition of parts, the effective area on the underside of the piston on which the steam is first admitted from the boiler is "annular," while the "upper side" of such piston has the full area exposed.

The position of parts here shown is such as when the pump is about to make an "up stroke;" E is the condenser, F and G the valves of the air pump, H the hot well, I a crosshead on the piston rod from which two chains pass over the wheels, J, to the balance weights K; L is the pump bucket, and M the bottom valve of the same. Steam first enters from the boiler at full pressure (say 50lbs.) beneath the annular portion of the piston, at the same time the vacuum operates on the upper a "full" area. But the high pressure steam has now only effected half its duty by this "up stroke," and is in an unfit state to be discharged into the condenser, not having parted with sufficient of its expansive power. Hence the necessity to re-admit it on the "upper" or full area side of the piston, when it is further expanded down to the atmospheric pressure, or as much below as deemed advisable.

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* The author here referred to drawings.

Thus is effected in one cylinder what in the compound engine requires two, while a ready form of direct action air pump is furnished without the necessity of applying beam or radius bar. The remaining power developed by this partially expanded high pressure steam on its second admission into the steam cylinder and final expansion, is absorbed in raising the balance weights, as well as by the resistance of the water to the bucket's descent.

An adjustment of these weights regulates the speed of the down stroke and period of rest at its termination. The slide valve is a simple modification of an everyday appliance, with an additional slide on the back, and an adjustable eccentric to regulate the period of admission. This valve is driven by a small auxiliary engine, which at the same time actuates the pump for the boilers, thus avoiding the necessity of tappet and cataract arrangements of Cornish engines, and affording additional means to feed the boilers when the large engine is at rest. As the exhaust steam leaves the cylinder, it passes through a multitubular chamber, B, in its way to the condenser; around these tubes the feed-water from this boiler pump circulates. Here it takes up a considerable temperature over and above that of the hot well from whence it was pumped, and thereby enters the boilers at a temperature close upon boiling point.

The lift-pump is of simple form, which in this case is all that is necessary to act upon a great amount of surface water.

The circumference of the bucket has six arms, terminating in a central boss. Upon this rim, and supported by these arms, are three annular cast-iron perforated plates, and upon these are vulcanised India rubber rings of similar form. Each ring rises a step above the one beneath, affording a free delivery to the water, the whole being held down by the cotter which attaches the piston rod to the central boss. The bottom clack is similarly constructed, and a manhole in the pump affords access thereto.

The space N, above the top of the pump, is enclosed, to confine the discharge water to its destined course, terminating upwards at the required height of delivery. In the outlet watercourse there are sluice boards, by which the "out" water can be kept back if entrance is required to the interior of the pump.

As height of delivery and depth of suction vary according to the state of the rams, the pump, when working at its lowest head, is merely a "lift pump," but when the height of discharge increases, it then acts as a "lift and force pump," and requires but a simple adjustment of the balance weights and expansion slide to suit the altered resistance.

In the ordinary "dash-wheel" appliances for land drainage, the "out" water is often so high as to impair the effective action of the wheel, and when the "inlet" is unusually low the slip is very serious. The pump arrangement prevents this, and works advantageously at all variations in the water level.

There would be no difficulty in constructing one of these "water lifts" of ten feet diameter discharging five-fold this amount, or applying a pair working alternate strokes, in which each would balance the other, or either could be worked singly, as above described.

A few words might not have been out of place as to the comparative merits of the "centrifugal pump" and its per cent. of duty, as compared with the best form of buckets or ram pumps. A passing query shall suffice. Suppose two of the best-arranged machines for raising water to be fixed working in competition; one a "lift pump," or a "force pump," or a "lift and force pump" (their results being about the same); its opponents shall be the best "centrifugal pump;" the water to be raised over a stand column which shall be twenty feet or more, and the power for each to deliver, full duty, say 20-horse. Apply 5-horse power to each, and water will rise a consequent height in the stand column. Increase to 10 and 15-horse power, it will rise higher, but here their respective characteristics come into play. If no additional power is given, the "lift pump" will be brought to a stand by the balance of forces, and no more power can expend itself; but the "centrifugal pump" will go on, "ad libitum," without discharge. Add another 5-horse power to each, and the "lift pump" will then undoubtedly deliver its 20-horse power of duty (less friction and leakage); but in some minds there may arise a query—does the "centrifugal pump" produce alike its total 20-horse-power results?

In conclusion, the subject of our illustrations, which you have been kind enough to allow being brought before you, claims no merit beyond adaption of uncomplicated parts to the end in view. If it has been thought worthy of attention my purpose is attained. The "direct-action system" is working its way simply and quietly, and needs no defence, while its reduction of first cost is, perhaps, the most powerful inducement to its adoption.

## RAILWAYS IN IRELAND.

The following is an abstract of a paper "On the Railway System in Ireland, the Government Aid afforded, and the Nature and Results of County Guarantees," read before the Institution of Civil Engineers, on the 16th instant, by Mr. G. W. Temans, M. Inst. C.E.:—

"This communication was suggested by the Address of Mr. Locke, M.P., President, in January last, which related, chiefly, to French railways. From that Address it appeared that, in 1854, the French railway shareholder received, on an average, 9 per cent.; while, on the other hand, in 1857, the English railway sharehelder only obtained 3·12 per cent., or less that what was derived from money invested in the Public Funds. In the one case assistance and protection had been afforded by the Government; but in the latter, as was well known, speculation had been allowed to take its freest development. The result was, that, at the end of 1856, in England and Wales alone, with an area of 58,000 square miles, there were 6,441 miles of railway opened; but in France, with an area of 204,000 square miles, there were only 4,060 miles of railway opened; so that England and Wales were relatively 500 per cent. better furnished with railways than France, and at the same time the accommodation on the individual lines was superior. It might be assumed, however, that although the shareholders lost by competing lines and duplicate stations, the country gained; for in no case has any line been actually closed for want of traffic, or because it was valueless.

"Ireland, in 1836, was a blank, as far as regarded railways, as it possessed, at that time, only the line from Dublin to Kingstown, about six miles in length. An extract was then given, from an official document, to show the then depressed condition of the country, which resulted in the appointment, in 1836, of a Government Commission, consisting of Sir John Burgoyne, Mr. Barlow, and Mr. (now Sir) Richard Griffith, 'to inquire into the manner in which railway communications could be most advantageously promoted in Ireland.' During the labours of this commission, many Joint Stock Companies were held in abeyance. The report was finally made in July, 1838, its main recommendations being considered sound and good. It advised the construction of great leading communications, each in possession of an important district, and strongly insisted on the vital importance of protecting them from the ruinous rivalry of competing lines. The lines actually made, however, especially in the northern part of the country, were widely different from those suggested by the Commissioners, and the railway interest had suffered accordingly. There were already two trunk lines to the north, instead of one, and a third line was in contemplation. Two main lines also existed to the West, and three to the South, from Dublin. It was imagined by the Commissioners, that the lines might be made for £11,000 per mile on an average; that the receipts would amount to seventeen pounds fifteen shillings per mile per week, on the supposition that the exports amounted to 700,000 tons; that the cost of locomotive power would be two shillings and three-pence per mile, at a speed of 30 miles an hour; that the utmost profits would not exceed 3½ to 4 per cent.; that the Western line could not be attempted without ruin to the shareholders,—it had since been made, and was paying a dividend of 5 per cent;—and that the line from Newry to Dundalk was physically impossible. Although these mistakes had been made, arising from want of experience, the final recommendations of the Commission were excellent. A uniform gauge was insisted on, although the exact dimensions recommended by them were not ultimately adopted; and government was advised to advance two-thirds, or even the whole, of the capital for the construction of the leading lines, the principal and interest of such advances to be secured on local or baronial rates, in such districts as should consent so to obtain the benefit of railways. This principle had already been adopted, in Ireland, for the Shannon navigation. The report was laid before government, but as no steps were taken to carry out its recommendations, great discouragement was given to the financial success of such undertakings by private companies. In this way speculation languished for nearly six years, only two lines—the Ulster and the Dublin and Drogheda—being slowly made. When, however, the railway mania attained its height in England, it extended to Ireland, and then the country began to make for itself, and with little regard for anything like a national system, the various lines now in existence, almost all of which were originated in 1845 and 1846. But the panic arose, and subsequently the famine of 1847, which stopped enterprise for a time; and although, as an alleviating measure, the Government were strongly urged to assist Irish railways, at which period only 123 miles had been opened, the Acts having been passed for 1,500 miles, yet the proposition was rejected, and instead, the people were fed without giving any labour in return, or were employed in the mockery of useless road-making. About eight millions sterling were so expended, none of which, although originally intended as a loan, had, the author believed, ever been returned to the Imperial Treasury. Subsequently aid was given to the railways to a considerable extent, in another form. More than two millions sterling were lent to Irish companies, who had obtained Acts of Parliament, through the agency of the Public Works Loan Commission; and although the rate of interest, in most cases five per cent., was, in the author's opinion, too high, the railway system had been materially assisted and promoted, and not one bad debt had been incurred. Only one line had been executed on the principle recommended by the Commissioners in 1838, that of charging a low rate of interest, secured on the guarantee of a local rate, in aid of the profits of the line, with an additional rate, commencing ten years after the opening of the line, and payable to the company, as a sinking fund, to replace the whole amount of the loan. This exception was in favour of the Midland Great Western of Ireland, to whom a loan of five hundred thousand pounds has been granted to construct the line between Athlone and Galway. The interest was at the rate of 3½ per cent., and the sinking-fund rate of 1½ per cent. additional. In this case, the representatives of the counties of Roscommon and Galway voluntarily consented to a compulsory rate, guaranteeing to make up the difference between the profits of the line and the interest, provided the Company were compelled to construct it with the borrowed money, and to pay out of their own funds the additional 1½ per cent. as a sinking fund. The time in which the whole sum would be repaid was about thirty-five years. The author having previously constructed the line from Dublin to Mullingar, was appointed to execute the extension to Athlone and Galway, the whole length of which, 76½ miles in extent, was opened simultaneously in August, 1851, within twenty-two months from the commencement of the works. In the first half-year the deficiency of profit was only 1·4 per cent., and afterwards 1·6 per cent., instead of the whole 3½ per cent.; and in every succeeding half-year the profits had increased, until they are now fully equal to the interest payable to Government. The total sums paid by compulsory rates on the county of Galway, and the two baronies of Roscommon, had amounted to £37,414. The author thought it would be conceded that the guarantee system had in this instance proved highly beneficial; and as a further proof that this was felt to be the case, he mentioned, that since the completion of the Galway line, many attempts had been made to obtain similar guarantees for other lines, but when the Bills came before Parliament, the most determined official opposition was given to the guarantee clauses, so that only three had passed—the Killarney Junction, the Bandon and Bantry, and the Bagnalstown and Wexford,—and in these the clauses were so hampered with impossible and useless conditions, and so emasculated, that they were found to be totally inoperative. Hence the original recommendation of the Railway Commission—that lines should be guaranteed by local rates, which had been successful in the only line attempted, had not been acted upon. The system had been found to work well in France and in other Continental States, as in India and other colonies—and was frequently compelled to be adopted in the case of gas, water, roads, drainage, &c., yet it was held to be inapplicable to railways.

" At the end of 1856, there had been constructed in Ireland 1,056 miles of railway, rather more than one-half of which were single line, though the works were for double way. The cost had amounted to fourteen millions, the average per mile having been less than fifteen thousand pounds, but lately this had been reduced to from six to seven thousand pounds per mile. The average receipts were twenty-one pounds per mile per week, the dividend amounted to 4¼ per cent., nearly, and the working expenses to 39 per cent. In England, these figures were, receipts sixty pounds per mile per week, dividend 3·56 and working expenses 49 per cent. respectively; the cost per mile having reached forty thousand pounds. The favourable result here indicated was attributed to economy in construction and in working."

## BRICKMAKING.

The *Ceylon Observer* contains an account of some brickmaking works recently visited by Sir Henry Ward. The works, which turn out about 20,000 bricks a day, are only six miles from Colombo. The clay for brickmaking is prepared by elephants. The wild and tame work together, and both attempt to shirk their work by endeavouring to put their feet in old footprints, instead of in the soft, tenacious, untrodden mud.

## Proceedings of Institutions.

Brighton.—The twelfth half-yearly report of the London, Brighton, and South-coast Railway Literary and Scientific Institution, being from March 21st to September 29th, 1858, shows that a considerable increase has taken place in the number of members as compared with the corresponding period last year, there being now 400 members, and only 220 in 1857. Amongst the 400 there are upwards of 80 who have become annual subscribers. The Saturday evening entertainments will be continued, and arrangements are being made to render them as entertaining and attractive as possible. The circulation of books shows a steady increase as compared with the previous half-year. The following classes have commenced for the winter season:—Reading, writing, and arithmetic; mechanical drawing; mutual improvement and discussion; and dancing.

Burnley (East Lancashire Union).—On Saturday, the 31st October, the annual meeting for the distribution of prizes to the successful candidates at the examination in connection with the East Lancashire Union of Mechanics' and other Institutions, was held in the lecture hall of the Church of England Literary Institution, Burnley. In the absence of the Bishop of Manchester, who was detained at the funeral of the late Sir John Potter, the Marquis of Hartington was called upon to preside, and distribute the prizes. The bishop arrived during the distribution. There were no candidates in the first class. In the second class there were 17 candidates, eight of whom obtained prizes and certificates of merit, and two certificates only. In the first section of the third class there were 31 candidates, 10 of whom obtained prizes and certificates, and two certificates only. In this section the president awarded a volume each to four of the candidates who were otherwise unsuccessful. In the second section of the third class there were 40 candidates, of whom 28 obtained prizes and certificates, and three certificates only. Of female candidates there were seven, three of whom obtained prizes and certificates, and two certificates only. The prizes consisted of money and books. The money prize in the second class, awarded to the most deserving candidate, was £3; in the first section of the third class, £2; in the second section of this class, and in the female class, £1. After the distribution of the prizes, the noblemen and gentlemen who had been invited on the occasion proceeded to address the meeting. The Marquis of Hartington briefly referred to the advantages offered to the members of the various Institutions in Union by the scheme of competitive examinations. His lordship read an extract from a letter received from Mr. Adderley, M.P., vice-president of the Committee of Council on Education, wherein he expressed his sorrow and his inability to be present at the meeting; but to show the interest he took in the success of the union, he proposed to offer a prize to be contended for by the members of the Institutions in the Union. Viscount Goderich rose to move the first resolution:—" That the success of the candidates for prizes in the first steps of a sound English education, and the increase of the number of the candidates from 20 in 1857 to 96 in 1858, afford satisfactory evidence of the painstaking self-devotion both of the directors and pupils of the majority of the Institutions in Union." After referring to the difficulty of retaining children at school to a sufficiently advanced age for them to attain the solidly-grounded elements of knowledge, he spoke of the system of continuing their education in evening schools and other similar institutions, and he felt bound to say, after reading the report forwarded to him some time previously by his friend, Sir J. P. K. Shuttleworth, that no means, of which he had heard, seemed so likely to be successful as that they were endeavouring to apply. The Union offered means by which the various Institutes might be brought together, and their respective merits tested by fair and open competition. In going on to notice the terms of the resolution he had moved, he said he must congratulate them on the gratifying statement there made. The increase of candidates from 20 to 96 was a convincing proof that the persons for whose benefit the Union was established were more alive to its advantages. The Bishop of Manchester seconded the resolution, which was supported by the Rev. W. J. Kennedy, and passed unanimously. The Right Hon. W. Cowper, M.P., moved the second resolution:—" That the Union of the several Institutions in East Lancashire, having evening schools, has enabled them to increase their means of instruction by the appointment of organising masters and local teachers, and by the Saturday evening lectures. And that the perseverance and success of the candidates for prizes afford a hope that the institutions may, with the aid of the organising masters, be able to raise a class of candidate teachers to assist in the instruction in the evening schools." This was seconded by Mr. Jonathan Peel, and carried. The meeting was afterwards addressed by Monckton Milnes, Esq., M.P., Mr. George Foster, Mr. Brooks, and Mr. F. Ecroyd.

Dorking.—The first annual meeting of the Literary and Scientific Institute was held in the large room of the Institute, on Tuesday, October 5th,—Mr. A. K. Barclay presided. Among those present also were Mr. C. Ellison, Mr. G. Cubitt, Col. Grissell, Mr. S. Highley, Mr. D. Matheson, Mr. C. Hart, Capt. Atcheson, Rev. Mr. Calvert, Rev. H. Seymour, Rev. J. O. Whitehouse, Mr. G. Arbuthnot, &c. The Chairman, in opening the business of the day, spoke of the excellent position of the society and its favourable prospects for the ensuing year. He warmly congratulated the society upon the prospect of having lectures delivered of a really intellectual character, and he was glad to see that it took a really scientific turn, as well as being an Institution of a literary character.—Mr. Durant, hon. sec., then read the report, which shows the financial position of the Institution to be favourable. The number of members has been increased upwards of 100, comprising 22 vice-presidents, 55 honorary, and 31 ordinary and junior members. The library actually possessed by the Institution is of course limited, but arrangements have been entered into with Messrs. Booth's library, and subsequently with that of Mr. Mudie, for a supply of standard works and of the latest contributions to general literature. The committee speak of the valuable and timely aid which the Society has received at the hands of Mr. Samuel Highley, one of the newly-elected vice-presidents, who has lent for the use of the Institution a most complete and costly laboratory, including a great number of instruments and specimens suitable for preparing or illustrating lectures on natural philosophy, chemistry, and natural history; and the committee have resolved on the formation of a museum, devoted to the exhibition of objects of local interest; and, in consideration of the services and ability of Mr. Highley, have determined upon conferring upon him the office of honorary director of the Laboratory and Museum. The committee hope that immediate steps will be taken for organising a series of lectures on literature and science during the approaching winter.—Mr. G. Browne, the treasurer, then read the financial statement, from which it appeared that the receipts amounted to £149 7s.; the expenditure to £109 15s. 8d.; leaving a balance of £39 14s. 4d. in favour of the Institution. The election of officers for the ensuing year then took place, and after some discussion in reference to the subject of evening lectures, several votes of thanks were passed and the meeting separated.

Queenshead (near Bradford).—The fifth annual meeting of the members of the Black Dike Mills Literary and Scientific Institution was held on Tuesday evening, the 5th ult., in the large class-room. The business was opened with a brief address by the chairman, A. B. Foster, Esq., president; at the conclusion of which he called upon the secretary, Mr. George Turner, to read the report of the directors. In this the Committee regret to state that there has been a considerable falling off in many branches of the Institution. The number of subscribers, as compared with the previous year, stands as follows:—

| | This Year. | | Last Year. | |
|---|---|---|---|---|
| | Males. | Females. | Males. | Females. |
| 1st Quarter | 143 | 22 | 137 | 18 |
| 2nd ,, | 127 | 18 | 135 | 10 |
| 3rd ,, | 104 | 9 | 121 | 17 |
| 4th ,, | 89 | 5 | 100 | 8 |

Shewing an average of 129 subscribers, and a reduction of eight from the previous year. The average attendance at the male classes during the winter months was 53, against 57 in the previous corresponding period, exhibiting a slight decrease; but, during the summer months, the average number in attendance was 37, whilst in 1857 it was only 34. The female classes have been again continued throughout the year, with an average attendance of 16, whilst last year's was only 12. These classes have, however, upon the whole, not received that support which might have been expected. The bye-law is still in force allowing subscribers not attending the classes themselves to nominate any individual employed by Messrs. Foster and Son to do so in their stead without extra charge. 29 have been so nominated this year, and in the last 27, which shows that the privilege continues to be duly appreciated. It is to be hoped that a much greater number of subscribers than hitherto will avail themselves of the opportunity thus afforded of assisting deserving youths of both sexes to improve their earlier education. The drawing class established last year, which was only continued during the winter season, consisted of 15 members, and it is proposed to resume it in the present session. Seventeen volumes have been added to the library during the year, making the total number 769. There have been 2,651 books and 264 periodicals issued during the year. This exhibits a considerable decrease, as last year the the issues were 3,256 books and 239 periodicals. The subscriptions for the year amount to £38 15s. 6d., and further sums received for the concert, lectures, &c., to £37 6s. 4d., making a total of £76 1s. 10d., which has not covered the expenditure by £1 8s. 11d.; this added to the balance of £5 17s. 6½d., due to the treasurer last year, makes a deficiency of £7 6s. 5½d. up to the present time. The annual concert was in November last, when a profit of £2 17s. 8d. was raised, besides admitting subscribers at half-price. Two lectures also have been given during the year, one by Mr. Blake, on "China and the Chinese," and the other by Mr. Vincent, on "Our Young Men and Women." The attendance at these lectures was, however, not so encouraging as the committee had expected. The cash account for the past year was read by the treasurer, Mr. James Briggs, and the various topics alluded to in the former document, more particularly the classes for females, as well as other matters affecting the welfare of the Institution, were discussed; and, judging from the remarks made, there is reason to believe that a better feeling towards the Institution will be manifested. The officers, directors, and librarians were then elected. Votes of thanks for their services were unanimously passed to the late officers and librarians. A similar vote, accompanied by hearty cheers, was passed to Messrs. Foster and Son, for gratuitously furnishing the necessary rooms, furniture, fires, and gas. From some remarks made near the close of the meeting, it seems not improbable that the Institution will be removed to larger, handsomer, and a more convenient suite of rooms before the next annual meeting.

Witham (Literary Institution). — On Tuesday evening, the 26th October, the annual meeting of the members and supporters of this Institution was held in the Lecture Hall, Captain Luard, R.N., in the chair. On the platform were the Rev. Sir John Page Wood, Bart.; Rev. J. Bramston; J. H. Pattison, Esq.; Rev. B. D. Hawkins, Rev. J. Goodday, Rev. R. T. Crawley, Mr. W. Butler, Mr. G. Wilkinson, &c. There was a very full attendance. Captain Luard, R.N., as chairman, in opening the business, said he felt strongly the benefit arising from such an Institution if liberally supported and well attended, and the desirability of embracing any good cause that would bring the different classes of society together. After speaking of the progress of knowledge and invention, and particularly of the advantages afforded by such Institutions as this for obtaining acquaintance with the events of the day, as well as for the general purposes of study, the chairman expressed his belief that their rooms would not accommodate a sufficient number of the public to defray the expenses of a lecturer, and he thought the growing requirements of the Institution demanded a greater space. He trusted, therefore, that in Witham they might find sufficient public spirit to raise funds for an entire new building. He was happy to inform them that their president Lord Rayleigh, their vice-president Mr. Ducane, and Mr. Sutton Western, had given them their sanction and support in the event of such an undertaking being commenced, and he had no doubt they should not appeal in vain to the surrounding neighbourhood. But supposing all the gentry of the county came forward to assist in the erection of a new building, it would be insufficient unless they obtained the permanent support of all classes.—Mr. Wilkinson, the secretary, read the fourteenth annual report, from which it appeared that sixty new members had joined, the subscription-list being better filled than at any former period, and the members, including the honorary and life members, numbering nearly 200. The issue of books had reached to 2,600, or 400 more than at any previous period. Three musical entertainments would be remembered with great pleasure, and much instruction had been derived from the gratuitous lectures of Lorraine Estride, Esq., Rev. J. Goodday, and Rev. T. D. Bernard, to whom their gratitude was due. The library had been increased by 100 new books, 45 consisting of a complete set of the Waverley novels; and the grand pianoforte on the platform was liberally subscribed for by the ladies of Witham. The report concluded by expressing a hope that the members would cordially unite with the committee, so that a long-continued course of prosperity and usefulness might attend the Institution. Mr. Butler, the treasurer, having read a brief but satisfactory financial statement, and the reports being unanimously passed, the chairman announced that he believed an old and staunch supporter of the Institution was ready to present them with a piece of ground on which to erect a new building, and he begged to propose that the committee be requested to take into consideration the best means for raising funds to erect the new building. The Rev. Sir John Page Wood, Bart., in seconding the resolution, said that all Institutions, to flourish, should be self-supporting, otherwise they would fall to the ground. He therefore suggested, for the consideration of the committee, in order to make the Institution self-supporting, to enrol every member as a shareholder in the property about to be erected. On the motion of Mr. Foster, seconded by Mr. W. E. Smith, the president and vice-presidents were re-elected, and Captain Luard, R.N., was elected a vice-president. The election of the committee for the ensuing year then took place. The Rev. J. Bramston moved, "That the thanks of the society be presented to the ladies who subscribed liberally for the purchase of a pianoforte, and to several gentlemen for gratuitous presentation of newspapers."—J. H. Pattison, Esq., seconded the resolution, which was passed; and thanks having been voted to the chairman, the meeting separated.

## MEETINGS FOR THE ENSUING WEEK.

Mon. ......Geographical, at Burlington House, 8½. I. "Notes, Geographical and Commercial, on the Gulf of Pecheli and the Peiho River," by Capt. Sherard Osborn. II. "Leichhardt and the Australian Desert," by the Rev. W. B. Clark.
London Institution, 7. Prof. Tyndall, "On Light."
Tues. ......Civil Engineers, 8. Discussion on "The Railway System in Ireland." And, if time permits, Mr. T. S. Isaac, "On the Successful Operation by Locomotive Power, over Gradients of 1 in 17 and Curves of 300 feet radius on Inclines in America."
Med. and Chirurg., 8½.
Zoological, 9.
Wed. ......Society of Arts, 8. Mr. F. Joubert, "On a Method of rendering Engraved Copper-Plates capable of Producing a greatly-increased Number of Impressions."
London Institution, 3. Mr. T. R. Jones, "On the Natural History of the Vertebrate Division of the Animal Kingdom."
Thurs......London Institution, 7. Dr. E. Frankland, "On the Air and Water of Towns."

## PATENT LAW AMENDMENT ACT.

### APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Nov.* 12, 1858.]

*Dated* 1st *September*, 1858.

1988; A. V. Newton, 66, Chancery-lane—Imp. in the manufacture of alumina. (A com.)

*Dated* 12*th October*, 1858.

2270. L. Wray, 5, Devonshire-street, Portland-place—New and improved compounds for the coating or insulating of submarine electric telegraph wires, and which are also applicable to the coating or insulating of electric telegraph wires laid underground.

*Dated* 14*th October*, 1858.

2290. J. R. Smith, Glasgow—Imp. in apparatus for propelling boats and vessels.
2292. W. Clark, 53, Chancery-lane—Imp. in tanning hides and in apparatus employed therein. (A com.)

*Dated* 16*th October*, 1858.

2312. J. P. Gillard, Paris—Imp. in generating hydrogen, and in the means of, and apparatus for, applying the same to heating and lighting purposes.

*Dated* 19*th October*, 1858.

2336. W. Gossage, Widnes, Lancashire—Imp. in the utilization of alkali waste.

*Dated* 26*th October*, 1858.

2385. A. V. Newton, 66, Chancery-lane—Improved machinery for pulverizing, kneading, pressing, and moulding clay and other plastic materials. (A com.)

*Dated* 27*th October*, 1858.

2387. B. Goodfellow, Hyde, Chester—Certain imp. in steam engines.
2388. J. Luis, 1b, Welbeck-street, Cavendish-square—A new syphon water-wheel, receiving its water without destroying the water level. (A com.)
2389. J. Luis, 1b, Welbeck-street, Cavendish-square—A new machine for boring. (A com.)
2390. J. Bleakley, Accrington, Lancashire—Imp. in boilers, flues, and the methods of fixing the same.
2391. A. P. A. Beau, 152, Regent-street, London—A pocket stereoscope.
2392. J. Kinsey, Brighton—Imp. in steam engines and pumps.
2393. C. Cheyne, Great George-street, Westminster—Imp. in the construction of floors and ceilings.
2395. G. Speight, 19, Woodbridge-street, Clerkenwell—Improved plaits and curls or ringlets for head-dresses or ornaments or additions to the natural hair, and an improved apparatus for the manufacture of curls or ringlets.
2396. M. Mason, Manchester—Imp. in letter-press printing machines.
2397. P. G. Gardiner, New York—Furnaces for reheating steel, preparatory to hardening, tempering, or annealing.
2398. T. Almond, 22, Pickering-place, Paddington—Imp. in furnaces for the better combustion of smoke.
2399. J. W. Mott, Lea Bridge-road—Imp. in pouches of india rubber for holding tobacco or other substances.

*Dated* 28*th October*, 1858.

2400. D. Varley, Over Darwen, Lancashire—"An improved picker for looms.
2401. G. M. Casentini and J. O. Barnard, Hercules-buildings, Lambeth—A certain composition to be used in the manufacture of articles composed of or made with plaster of Paris and other similar substances.
2402. P. G. Gardiner, New York—A new and useful apparatus for cooling and preserving an equable and low temperature in the oil or composition, or other fluid mixture used for the purposes of tempering, annealing, or hardening steel.
2403. J. Westerby, Upper Aspley, Huddersfield—An improved application of steam to vessels filled with oil, tallow, or other materials for lubricating the cylinders of steam engines of high or low pressure.
2404. C. Pooley, Manchester—Certain imps. in and applicable to carding engines and other machines for preparing cotton and other fibrous materials.
2405. T. Railton, Manchester—Imps. in the apparatus employed in the manufacture of cap or bonnet fronts.
2406. A. Heywood, Manchester—Imp. in machinery or apparatus for suspending paper and woven fabrics to be dried. (A com.)
2407. J. Evans, Brewers' House, Nine Elms, Battersea—Imp. in lubricating the slide valves and pistons of steam engines and in apparatus for this purpose.
2408. B. Foster, Denholme, near Bradford, and P. Smith, Keighley—Imp. in machinery or apparatus for spinning and doubling wool, alpaca, mohair, cotton, silk, flax, and other fibrous substances.
2409. W. Munro, 32, Bartholomew-close—A new manufacture of capsules and other metallic articles.
2410. J. Smith, Bristol—Improved hats and coverings for the head.
2411. W. Hall and A. Wells, Erith—Imp. in electric telegraph cables, and in machinery employed in the manufacture thereof.

*Dated* 29*th October*, 1858.

2412. P. Brunon, Paris—An improved mode of manufacturing cocks.
2413. W. Kirrage, 10, Goulstone-buildings, Bermondsey New-road—An improved elastic combination of materials impervious to atmospheric influences, as a substitute for hard woods, metal, leather, or felting, and for other purposes.
2414. J. Dransfield, Water Head Mill, Oldham—Certain imp. in cocks, taps, or valves.
2415. P. Wright, Dudley, Worcestershire—Imp. in the manufacture of anvils.
2416. W. E. Newton, 66, Chancery-lane—An improved method of attaching wheels to the axles of railway carriages. (A com.)
2417. J. Dixon, Jersey City, U.S.—A method of manufacturing steel.
2418. J. Wright, 21, Bridge-street, Blackfriars—An improved application of machinery, to be used as a new motive propelling power. (A com.)
2419. G. Zanni, Union-street, Barnet—Imp. in arranging magneto-electric machines for medical and other purposes.
2420. R. W. Chandler, Bow, and T. O. Hatfield, Hertfordshire—Imp. in agricultural apparatuses for ploughing and otherwise operating upon land.
2421. R. A. Brooman, 166, Fleet-street—Imp. in obtaining motive power. (A com.)
2422. L. J. Lewis, New Bridge-street, Birmingham—Certain imp. in fastenings for ladies' dresses and other such like purposes, as also in the machinery for manufacturing the same.
2423. J. Morris, Broughton, Salford, Lancashire—Imp. in the manufacture of rollers or cylinders for printing fabrics.
2424. J. Drummond, Midlothian, N.B.—Imp. in reaping and mowing machines.
2425. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in photography, and in the apparatus connected therewith. (A com.)

*Dated* 30*th October*, 1858.

2426. R. J. Coningsby, London—Improved apparatus for turning over the leaves of music or of books.
2427. E. T. Hughes, 123, Chancery-lane—Imp. in machinery or apparatus to prevent railway accidents. (A com.)

*Dated* 1*st November*, 1958.

2429. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in machinery for weaving velvets and other piled fabrics. (A com.)
2431. H. H. Henson and W. F. Henson, 38, Parliament-street—Imp. in the manufacture and treatment of starch for domestic purposes.
2433. J. Cariss, York—An improved safety switch-box and gear.
2435. C. Perley, New York, U.S.—Certain improved means for disconnecting boats from the davit blocks, and effecting other like objects.

## WEEKLY LIST OF PATENTS SEALED.

[*From Gazette, Nov.* 16, 1858.]

*November* 16*th.*

682. M. Duce.
1092. J. H. Johnson.
1094. J. and W. Allen.
1097. W. H. Bagnall.
1098. W. Raymond.
1099. C. W. Harrison.
1103. R. Imeary and T. Richardson.
1108. E. C. Brochand.
1111. J. Brown.
1113. W. MacNaught and W. R. Critchley.
1120. W. Clark.
1135. J. Apperly & W. Clissold.
1141. J. Ronald.
1147. J. H. Johnson.
1157. M. Stevens.
1176. J. Luis.
1209. E., R., and P. Sykes.
1228. A. Barchou.
1244. J. Meikiejon.
1286. R. Wappenstein.
1294. J. Rawlings.
1298. D. Moseley.
1310. C. Cammell.
1311. J. Roberts.
1339. A. F. Newton.
1352. Baron Ferdinand Julius of Wedel-Jarlsberg.
1414. S. Barlow.
1523. J. Holland and F. Potts.
1677. J. Cooke.
1706. J. Miles.
1903. M. Benson.
1944. F. J. Evans.
1989. W. E. Newton.
2101. E. Welch and J. Biggs.

### Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, Nov.* 12, 1858.]

*November* 8*th.*

2519. C. Whipple.

*November* 10*th.*

2534. H. Wickens.
540. G. Cooke.
2581. G. T. Bousfield.

[*From Gazette, Nov.* 16, 1858.]

*November* 13*th.*

2535. W. Crosley.
2553. J. Wilkinson, senr., and J. Wilkinson, junr.
2645. J. Jobson.
2653. C. Sanderson.